No. of Printed Pages : 5

CS-07

03739

ADCA / MCA (II Yr.)

Term-End Examination

June, 2011

CS-07 : DISCRETE MATHEMATICS

Time : 3 hours *Maximum Marks : 75*

Note : *Question No.* ***1*** *is* ***compulsory.*** *Attempt* ***any three*** *from the rest.*

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1. (a) Write the following statements in predicate form. **3**

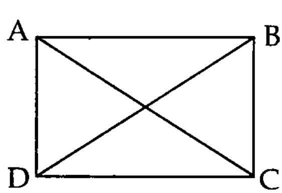
(i) Rakesh is a man.

(ii) All that glitters is gold.

(iii) Some women are beautiful.

(b) Obtain principal conjuctive form of $(\neg P \rightarrow R) \wedge (Q \rightleftarrows P)$. **4**

(c) What is a planar graph ? Is the following graph planer ? Support your answer by proper argument. **3**



(d) Define the following terms with suitable examples : 5

(i) Spanning Tree

(ii) Eulerian Path

(iii) Connected Graph

(e) Let A = {1, 2, 3, 4, 5} be a set and R be relation A such that (a, b) ∈ R iff a < b 5

(i) Write R.

(ii) Is R symmetric ? Give argument.

(iii) Is R reflexive ? Give argument.

(iv) Find R^2.

(v) Find $\overline{R}$.

(f) Write short note on fuzzy relations. 5

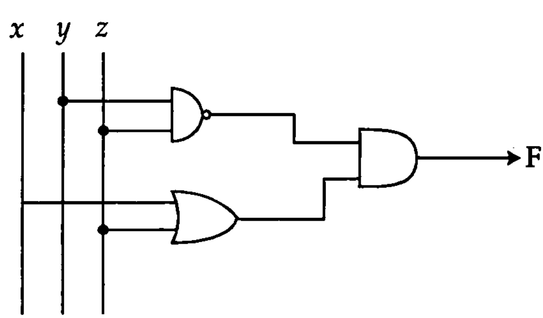
(g) Solve the following boolean function using karnaugh map. 3

F (A, B, C) = Σ 0, 1, 4, 5, 6

(h) Compute 49-58 using 8 bit 2'S complement arithmetic. 2

2. (a) Express $P \wedge Q$, $P \vee Q$ using $\neg$ and $\rightarrow$ only. 4

(b) Describe the output of following gating network. 3



(c) Explain the following mechanism of inference **4**

(i) Modus Ponens

(ii) Modus tollens

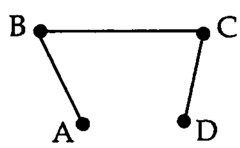
(d) Prove the following equivalence **4**

(i) $\sim \forall_x E(x) \equiv \exists_x \sim E(x)$

(ii) $\sim \exists_x P(x) \equiv \forall_x \sim P(x)$

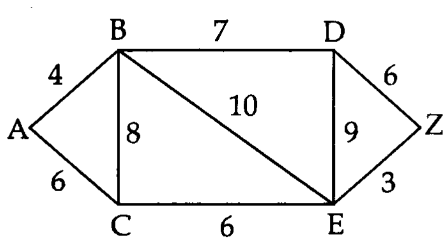
by giving suitable argument

3. (a) Write the matrix representation of following graph G (adjacency matrix) and prove that graph G is connected. **5**



(b) Write a short note on Konisberg's 7 bridges problem. **5**

(c) Find the shortest path length from A to Z in following graph using Dijkastra's algorithm. **5**



4. (a) Make Venn diagrams for the following. 3

(i) $A \cup (B \cap C)$

(ii) $\overline{A}$

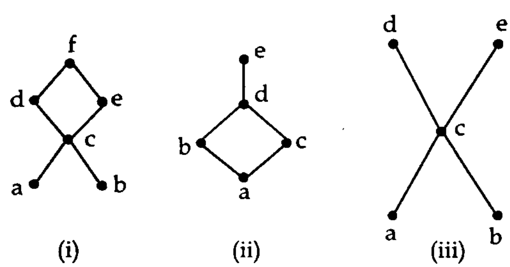
(iii) $A - B$

(b) Let $A = \{1, 2, 3, 4, 5\}$ and R be a relation on AXA such (a, b) $\in$R iff a mod 3 = b mod 3. Write R. Show that R is an equivalence relation. Also write A/R. 5

(c) Define poset. Let I be the set of positive integer and 1 be the divisibility operation. Prove that (I, 1) is a poset. 5

(d) Is $F(x) = \sqrt{x}$ a function. Give argument to support your answer. 2

5. (a) Which of the following is not a lattice and why ? 3



(b) Make D (40) All positive divisors of 40 lattice. 3

(c) Design the circuit for full adder. 7

(d) Represent the following circuit using a gating network. 2